

Alternate Energy Systems

Course Code: 21057

Rationale Statement:

Alternate Energy systems play a critical role in everyday life, and as such are an important part of engineering. This course serves as an introductory course in alternative energy. This is a survey of wind, biomass, solar, geothermal, and other non-traditional energy sources, characteristics, and application by means of projects and hands-on activity, and other experimental activities. This course also provides a close look at the “Green Automobiles” of the future.

Suggested Grade Level: 10 - 12

Topics Covered:

- History of Energy Generation
- Energy Consumption
- Energy Systems
- Environment
- Atmospheric Science & Weather

Core Technical Standards & Examples

Indicator #1: Explore the history of alternative energy	
Bloom's Taxonomy Level	Standard and Examples
Understanding	<p>AES.1.1 Understand the influence of energy generation on history</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify various energy generation technologies throughout history • Analyze the significance of energy generation and the growth of society • Explain the relationship between energy production and public demand
Evaluating	<p>AES.1.2 Evaluate the role of society in the development and use of energy generation methods</p> <p>Examples:</p> <ul style="list-style-type: none"> • Evaluate the demand levels for energy usage for industrialized nations • Summarize the influence energy has had on developing nations • Summarize the influence energy systems had on technological advancements

Indicator #2: Investigate a basic understanding of alternative energy	
Bloom's Taxonomy Level	Standard and Examples
Analyzing	<p>AES.2.1 Compare and contrast energy consumption patterns</p> <p>Examples:</p> <ul style="list-style-type: none"> Analyze data to select the most appropriate technology for the given problem Make precise calculations and check the validity of the results from the context of the problem Determine the appropriate technology based upon energy consumption needs
Understanding	<p>AES.2.2 Understand the key concepts of technology</p> <p>Examples:</p> <ul style="list-style-type: none"> State some of the energy theory behind the 'greenhouse effect' Analyze data to select the most appropriate technology for the given problem Make precise calculations and check the validity of the results from the context of the problem
Understanding	<p>AES.2.3 Understand the key terms of technology</p> <p>Examples:</p> <ul style="list-style-type: none"> Define alternative energy Define renewable energy Define non-renewable energy
Understanding	<p>AES.2.4 Explain alternative energy systems</p> <p>Examples:</p> <ul style="list-style-type: none"> Identify various wind energy systems State that wind energy can be used to generate electricity State the energy conversion taking place in a wind turbine

Indicator #3: Understand the energy content of major energy systems	
Bloom's Taxonomy Level	Standard and Examples
Analyzing	AES.3.1 Analyze the characteristics of wind energy systems Examples: <ul style="list-style-type: none"> • Identify various types of wind energy systems • Analyze structures in wind energy systems • State that wind energy can be used to generate electricity
Analyzing	AES.3.2 Analyze the characteristics biomass energy systems Examples: <ul style="list-style-type: none"> • Identify the various types of biomass systems • Identify the types of biomass • Analyze the various processes used to convert biomass into energy
Analyzing	AES.3.3 Analyze the characteristics solar energy systems Examples: <ul style="list-style-type: none"> • State that solar energy can be used to generate electricity • State the energy conversion-taking place in solar panels • Analyze the environmental benefits for using solar energy systems
Analyzing	AES.3.4 Analyze the characteristics geothermal energy systems Examples: <ul style="list-style-type: none"> • Identify the various types of geothermal systems • Compare the advantages and disadvantages of using geothermal energy • Analyze he various processes used to convert geothermal into energy
Analyzing	AES.3.5 Analyze the characteristics traditional energy systems Examples: <ul style="list-style-type: none"> • Identify the correct energy flow in a nuclear power plant • Identify the processes involved when using nuclear energy to generate electricity • State the environmental benefits for using traditional energy systems

Indicator #4: Understand the environmental and economic cost of using alternate energy generation technologies	
Bloom's Taxonomy Level	Standard and Examples
Understanding	<p>AES.4.1 Understand the environmental effects of alternate energy sources</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify how water can be used to generate electricity • Identify the purpose of the sub-systems within a hydroelectric Power plant • State that wind energy can be used to generate electricity
Analyzing	<p>AES.4.2 Analyze the cultural, social economic and political effects of alternate energy sources</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify jobs provided by the alternative energy industries • Identify the problems associated with non-renewable energy resources • Identify some of the ways in which alternative energy sources are being used globally

Indicator #5: Understand how weather affects energy production	
Bloom's Taxonomy Level	Standard and Examples
Understanding	<p>AES.5.1 Understand the effects of energy production on the environment</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify the problems associated with non-renewable energy resources • Identify the normal pH value of rainwater • Classify substances in order of acidity
Understanding	<p>AES.5.2 Explain how weather effects energy production</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify some of the ways in which alternative energy sources are being used globally • Identify the need to preserve existing energy resources and to find new methods of providing energy • Indicate how the uses of fossil fuels harm the environment

Indicator #6: Understand the use of alternative energy systems	
Bloom's Taxonomy Level	Standard and Examples
Understanding	<p>AES.6.1 Identify that energy can be produced from a variety of sources</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify two transducers used in the solar powered car • Identify the function of components in a model rocket • State the function of a solar panel transducer
Understanding	<p>AES.6.2 Explain the advantages and disadvantages of alternative energy</p> <p>Examples:</p> <ul style="list-style-type: none"> • Build a motor support structure and powers it to lift a weight with the most appropriate power supply • Identify factors affecting the price of electricity • Analyze data to select the most appropriate technology for the given problem